

Mechanical Properties of Boron Containing Thin Films Prepared by Magnetron Sputtering Method

by

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Abstract

Thin films containing boron have been prepared on silicon substrates by DC magnetron sputtering using a sintered B₄C target. The influences of N₂ or H₂ addition as a plasma gas on nanoindentation hardness, adhesive strength to the substrate and the friction coefficient of the films are investigated. Nanoindentation studies show that N₂ addition in the film formation process leads to a lower hardness of the film. The lack of a three-dimensional B-C-N network in the films is thought to be a reason for the deterioration in the nanoindentation hardness of the films. On the other hand, the adhesive strength is increased significantly by N₂ or H₂ addition in the film formation process, although the frictional properties of the film against a steel ball in an ambient atmosphere are not improved in this study.

Keywords: magnetron sputtering, thin film, boron, B-C-N, nano-indentation hardness, adhesive strength